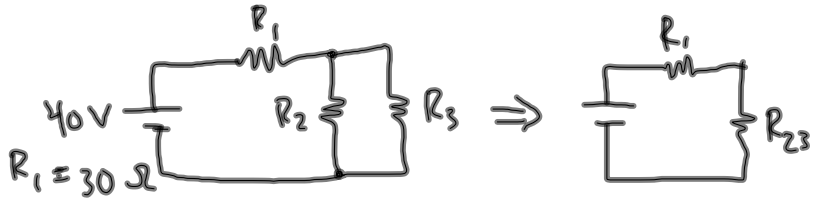
HW: p. 800: 5, 7

p. 801: 9, 15

Finding V's and I's of Resistors:



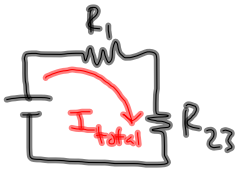
$$\frac{1}{R_{23}} = \frac{1}{R_2} + \frac{1}{R_3}$$

$$R_{23} = 14.3\,\Omega$$

$$R_{eq} = R_1 + R_{23} = 44.3\,\Omega$$

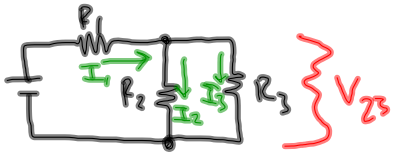
$$V_{total} = I_{total} R_{eq}$$

$$I_{total} = \frac{40\text{ V}}{44.3\,\Omega} = 0.903\text{ A}$$



$$V_1 = I_{total} R_1$$
$$= (.903\text{ A})(30\,\Omega)$$
$$= 27.1\text{ V}$$

$$V_{23} = I_{total} R_{23}$$
$$= (.903\text{ V})(14.3\,\Omega)$$
$$= 12.9\text{ V}$$



$$V_{23} = I_2 R_2$$

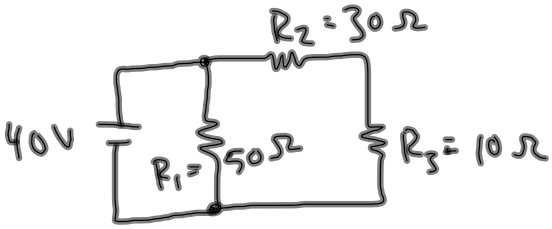
$$I_2 = \frac{12.9\text{ V}}{50\,\Omega} = 0.258\text{ A}$$

$$V_{23} = I_3 R_3$$

$$I_3 = \frac{12.9\text{ V}}{20\,\Omega} = 0.645\text{ A}$$

Electric Power: [units: W]

$$P = IV = I^2R = \frac{V^2}{R}$$

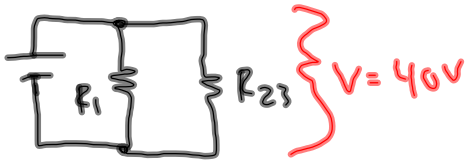


$R_{23} = R_2 + R_3 = 40\,\Omega$

$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_{23}}$ $R_{eq} = 22.2\,\Omega$

$V_{total} = I_{total} R_{eq}$

$I_{total} = \frac{40\,V}{22.2\,\Omega} = 1.80\,A$

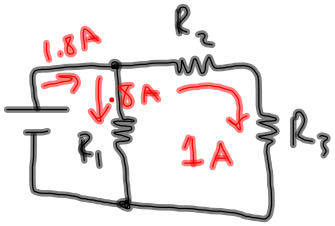


$V = I_1 R_1$

$I_1 = \frac{40\,V}{50\,\Omega} = 0.8\,A$

$V = I_{23} R_{23}$

$I_{23} = \frac{40\,V}{40\,\Omega} = 1\,A$

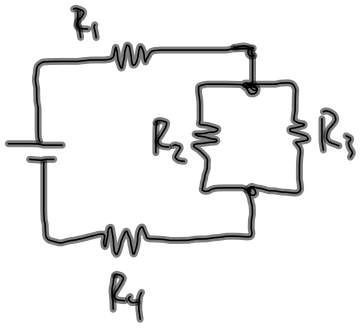


$V_2 = I R_2$

$= (1\,A)(30\,\Omega) = 30\,V$

$V_3 = I R_3$

$= (1\,A)(10\,\Omega) = 10\,V$



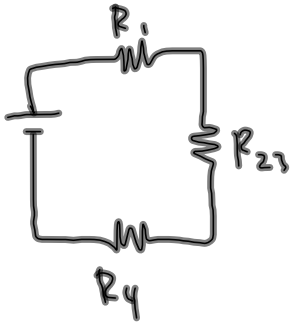
$R_1 = 20\,\Omega$

$R_2 = 30\,\Omega$

$R_3 = 10\,\Omega$

$R_4 = 10\,\Omega$

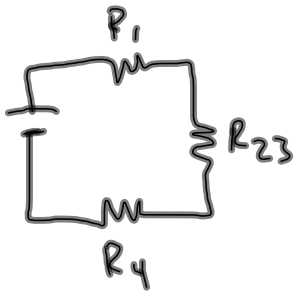
$V_{total} = 40\,V$



$\frac{1}{R_{23}} = \frac{1}{R_2} + \frac{1}{R_3}$ $R_{23} = 7.5\,\Omega$

$R_{eq} = R_1 + R_{23} + R_4 = 37.5\,\Omega$

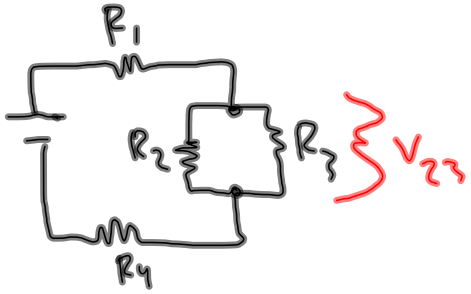
$I_{total} = \frac{V_{total}}{R_{eq}} = \frac{40\,V}{37.5\,\Omega} = 1.07\,A$



$V_1 = I_{total} R_1 = 21.4\,V$

$V_{23} = I_{total} R_{23} = 8\,V$

$V_4 = I_{total} R_4 = 10.7\,V$

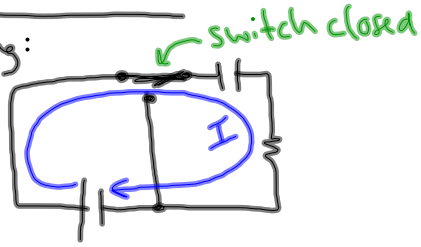


$I_2 = \frac{V_{23}}{R_2} = .268\,A$

$I_3 = \frac{V_{23}}{R_3} = .803\,A$

RC Circuits:

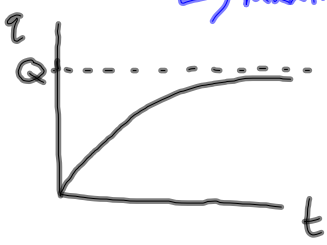
- Charging:



- Charge of capacitor:

$$q(t) = Q(1 - e^{-t/RC})$$

↳ maximum charge

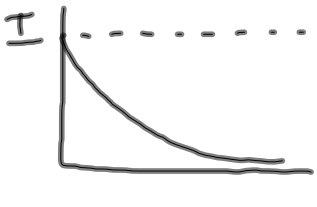


$\tau = RC$ (greek letter tau)

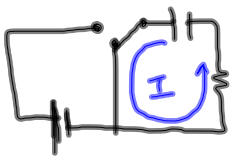
this is the time constant of the RC circuit

- Current:

$$I(t) = \frac{V}{R} e^{-t/RC}$$

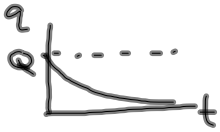


- Discharging:



- Charge on capacitor:

$$q(t) = Q e^{-t/RC}$$



- Current:

$$I(t) = -\frac{Q}{RC} e^{-t/RC}$$